



A Study of the Physico Chemical Analysis of the Ground Water and Surface Water due to the Impact of Dyeing Industries Effluents in and around Nallur

C. Gopalakrishnan¹, N. Latha², S. Philip Arockiaraj³, C. Sivakumar⁴, A. Pandia Rajan⁵,
M. S. Dheenadayalan^{6*}

^{1,2}Department of Chemistry, Kandaswami Kandar's College, P.Velur, TN, India.

^{3,4,5,*6}Department Of Chemistry, G.T.N Arts College, Dindigul, TN, India.

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Abstract

The investigator has taken an attempt to evaluate the impact of Dyeing Industry effluent and sewage Water in Noyyal River in and around Nallur at Tiruppur. In the Study area it is observed that the people utilized the Surface water and ground water on the banks of the river, for domestic and agriculture purpose. Now there are 2000 residents are living in the river bank at Nallur. Now the Noyyal River is receiving the Dyeing Industry effluent and sewage from the houses. The surface water in the Noyyal River is affected badly due to the continuous discharge of the Dyeing Industry effluent along with the sewages. During the rainy session the surging rain water mix with the Dyeing Industry effluent and reaches the river and the ground water. Hence the ground water on both sides of river is polluted by percolation of the effluent. Water quality analysis of surface Water, bore water and open well water reveals that the water cannot be used for domestic and agricultural purposes. The high content of Dyeing in the surface water and the ground water confirms the pollution caused by the discharge of untreated Dyeing Industry effluent from the Dyeing industry. Once an aquifer is polluted by percolation of contaminated water it is very difficult for reclamation. It is observed from the Water Quality analysis that TDS, Hardness high concentration of Chloride, causes the water to be saline. It is also observed that Dyeing is very high when compared to BIS Standards. The Quality reveals in the ground water with high concentration of Ca, Mg, Na and Phosphate. It is observed that neither the river water and the ground water is Portable. Very significant results are observed in the content of Dyeing, TDS, Ca, Mg and phosphate both in the river and in the ground water. Water quality parameters are above the limits as per BIS standards. The possibility of contributing diseases of blue baby Syndrome and Stomach cancer are to be seriously considered in the study area.

Keywords : BIS Standards; Dyeing Industry; Ground Water; Surface Water.

1. INTRODUCTION

1.1. Water

Water sources available for drinking and other domestic purposes must possess high degree of purity, free from chemical contamination and microorganisms. The rapid growth of urban areas has further affected the groundwater quality due to over exploitation of resources and improper waste disposal practices (Rajankar *et al.* 2009). It is a binary compound that occurs at room temperature as a clear colorless odorless tasteless liquid; freezes into ice below zero degrees

centigrade and boils above hundred degrees centigrade; widely used as a solvent.

In India the production of Dyeing ore was merely 3 million tones but it has reached 75million whereas steel production has jumped from mere 1.04 million tons in 1950-51 to 25.1 million tons in 1997-98 (Agarwal Ranjana, 2009). Government of India vide press note no. 9 (1984 series) dated 21st June, 1984 has published a list of 20 industries causing high pollution. The list includes Dyeing and steel industry also (Babushakila and Usha, 2009). In view of this, it is felt necessary to go into the aspects of the envDyeingment

***M. S. Dheenadayalan**

email: dr.msdcchem@gmail.com

impact assessment of steel industry. Soil has complex function which are beneficial to human & other living organism. It act as a filter, buffer storage, and transformation system and thus protects the global ecosystem against the adverse effects of environmental pollutants (De, 2000).

Plants absorb metals from soil, water and air. The chief source of metal absorption is soil. Uptake from it depends not only on total content of metal but also on its accessibility to roots and transfer across the soil root (Panda and Kar, 1998). The total amount of metal in soil, affected by the inherent Impact of Steel Industry Waste on PhysicoChemical Property of Soil natural resources of particular areas in addition to agricultural and industrial activities (Rowell, 1994). Metals present in ionic state in soil solution are available, while those which are bound to rock material are least available.

Accessibility of Co, Mn and Ni increases with decrease in pH, while that of Mo and Si increase with rise in pH. In metal uptake are observed in different plant species (Shaxson, 1996). Some plants are known to have special affinity for accumulating certain metals e.g. Astragalus sp.(Se), Croton cobalticola (Co), Phaseolus vulgaris roots (Zn), Alga Chlorococcum vulgaris (Au) and Sebertia accuminata (Ni) etc. Sebertia accuminata is Caledonia Site of world's largest Ni deposits (Torkashvand Mohammadi, 2010). Its leaves and latex may contain up to 10g and 250g per kg of Ni compounds on a dry weight basis. Aquatic plants accumulate several hundred fold amount of Ag as compared to other plants (Van Breemen, 1993).

In India the environmental pollution through industrial effluent has become a cause of concern at various levels (Chauhan et al. 2000). The air, soil and water pollution by industrial effluent are associated with various diseases and could be reason for the current shorter life expectancy (WHO, 2002; 2003). The sewage effluents from industries contain moderate amounts of metallic cations. The study of mobility of toxic metals in industrial effluent (Kazi et al. 2005) was determined by various techniques. When toxic substances enter into water bodies, they get dissolved or lie suspended in water or get deposited on the bed. This results in the pollution of water whereby the quality of the water deteriorates, affecting aquatic ecosystems. Long term irrigation of such effluent affects on soil quality (Olaniya et al. ; Brar et al. 1997). Pollutants can also seep down and affect the groundwater deposits.

1.2 Textile Industry

Textile industry is one of the few basic industries that have always been a necessary component of human life. One may classify it as a more glamorous industry, but whatever it is, it provides with the basic requirement called clothes. This chapter is about textiles. The researcher has given in this chapter all possible terms and concepts involved in textile production process. Most of these terms are technical. This chapter is an attempt to understand clear cut ideas about research topic. It gives an insight about terms that are used all around the world in context of textile industry. There are numerous kinds of fibres and other raw materials, which are used to produce a cloth. But most of them are unheard of. This chapter is designed in such a way that it is easy to understand the basics of textiles. In any study of textile fabrics the meaning of the word textile must be made clear. The dictionary states that the word is derived from the Latin word 'texere' to weave, but a wider meaning than simply that of weaving must be accepted since that is only one of various ways of making textile fabrics.

1.3 Stages of Textile Manufacturing

The initial stage of textile manufacturing involves the production of the raw material either by farmers who raise cotton, sheep, silkworms, or flax or by chemists who produce fibre from various basic substances by chemical processes. The fibre is spun into yarn, which is then converted into fabric in a weaving or knitting mill. After dyeing and finishing, the woven material is ready for delivery either directly to manufacturer of textile products where they are finally stitched into clothes that we wear.

2. SCOPE AND OBJECTIVES OF THE STUDY

The number of industries like Dyeing industry and sewage from residential area are discharged from the houses, located around the Noyyal River and also from the other canals discharges the polluted water in to the river without any treatment. The volume of the effluent is increasing day by day. The absence of the treatment plant to treat the industrial waste water and the sewage water may lead to the spoilage of Environment. One fine morning people will not be able to get good quality of drinking water from the surface water and the ground water in and around the Noyyal River Bed. The environmental damage caused by water pollution due to the discharge of Dyeing industry effluent and sewage water in Noyyal River has not been studied so far.

2.1. Objectives

1. To analyze the physico- Chemical parameters of the surface water in Noyyal River at Nallur of Tiruppur.
2. To analyze the physico- Chemical parameters of the ground water present in the open wells and bore wells on the both sides river bank.
3. To recommend a suitable remedial measure for the treatment of polluted Ground Water using R.O system.

3. MATERIALS & METHODS

The River Noyyal passes through the village at Nallur from east to west, dividing the village between the north to south being connected through the bridge and causeways. The Dyeing industry located on the northern side of the Noyyal River with a distance 5 km. Water samples from the river for a stretch of about two kilometers length along the northern and southern banks of river were collected for analysis. The river receives from the west upstream, large volume of untreated Dyeing industry effluent through the canals with three meters broad. River water samples were collected at two different places along the route. Ground water samples were also collected from the bore wells with a distance of about 400 to 500 meters away from the river bank.

4. RESULTS & DISCUSSION

Water Quality study were under taken from samples of water at Noyyal River. The surface Water and the ground water in and around the Noyyal River at Nallur village were taken for the analysis. It is therefore essential now to examine the results and interpret the findings. The purpose is to how far these samples measure up to the standards expected to fulfill the needs of a safe drinking water for the Population depending on them. There are standards set by various national bodies

like the U.S.P.H. (United States Public Health Standards) and B.I.S (Bureau of Indian Standard) and also international bodies like the WHO (World Health Organization).

S.No	Parameter	Method Of Analysis
1	Turbidity	Neplo turbidity meter
2	TDS	Conductivity method
3	Electrical conductivity	Conductivity meter
4	p ^H	pH Meter
5	Total hardness	EDTA Titrimetric method
6	Calcium	EDTA Titrimetric method
7	Magnesium	Calculation from Total Hardness
8	Dyeing	Spectrophotometer
9	Ammonia	Nessler's Method
10	Nitrite	Spectrophotometer
11	Nitrate	Spectrophotometer
12	Chloride	Silver nitrate
13	Fluoride	Colorimetric meter
14	Sulphate	Turbidity method
15	Phosphate	Spectrophotometer

4.1 Water Quality

The results of various water samples for the various physico-chemical analysis from different sites in, the study area presented and discussed.

Parameters	S1	S2	S3	S4	S5	S6	S7	S8	S9	Permissible limit
Ph	7.5	7.4	7.6	7.8	7.4	7.2	7.4	7.5	7.4	7.0 - 8.5
Turbidity NT	8	9	8	7	6	6	7	8	6	1
Total Hardness	2400	2000	1780	1900	1800	1780	1710	1600	1560	200
Calcium as Ca	430	405	397	390	360	340	316	380	290	75
Magnesium as Mg	270	240	250	270	210	200	200	160	150	30
Nitrite as NO ₂	0.18	0.17	0.16	0.14	0.13	0.11	0.14	0.13	0.12	-
Nitrate as NO ₃	0.18	0.11	0.10	0.9	0.8	0.7	0.6	0.5	0.3	45
Chloride as Cl	3900	3600	3400	3200	3000	2800	2700	2060	2400	200
Fluoride as F	1.2	1.1	0.9	0.8	0.7	0.7	0.5	0.3	0.2	1.0
Sulphate as SO ₄	210	201	206	194	186	201	182	120	118	200

Results are expressed in mg/l

5. SUMMARY & CONCLUSION

The investigator has taken an attempt to evaluate the impact of Dyeing Industry effluent and sewage Water in Noyyal River in and around Nallur at Tiruppur. In the Study area it is observed that the people utilized the Surface water and ground water on the banks of the river, for domestic and agriculture. Purpose now there are 1000 to 2000 residents are living in the river bank at Nallur. Now the Noyyal River is receiving the Dyeing Industry effluent and sewage from the houses. The surface water in the Noyyal River is affected badly due to the continuous discharge of the Dyeing Industry effluent along with the sewages, during the rainy session the surging rain water mix with the Dyeing Industry effluent and reaches the river and the ground water. Hence the ground water on both sides of river is polluted by percolation of the effluent. The discharge of the Dyeing Industry effluent increases the pollution level in the river. It is observed that in the present study, that the river is naturally favorable for discharge of Dyeing industrial effluent during rainy session.

It is observed from the Water Quality analysis that TDS, Hardness high concentration of Chloride, causes the water to be saline. It is also observed that Dyeing is very high when compared to BIS Standards. The Quality reveals in the ground water there is a high concentration of Ca, Mg, F and Sulphate. It is observed that neither the river water and the ground water is Portable. Very significant results are observed in the content of Ca, Mg, F and Sulphate both in the river and in the ground water. Water quality parameters presents are above the limits as per BIS standards. But the possibility of their contributing to diseases of blue baby Syndrome and Stomach cancer are to be seriously considered. It is safe to take steps to remove these ions by suitable methods like reverse osmosis.

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